West Nile Virus Surveillance and Response

U.S. National and Michigan
2002

Michigan Department of Agriculture
Animal Industry Division

Steven Halstead, D.V.M., M.S.

Acknowledging…

- Kathryn Herbst, MSU CVM Class of 2004
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- Dr. Roger Maes, MSU DCPAH Virology
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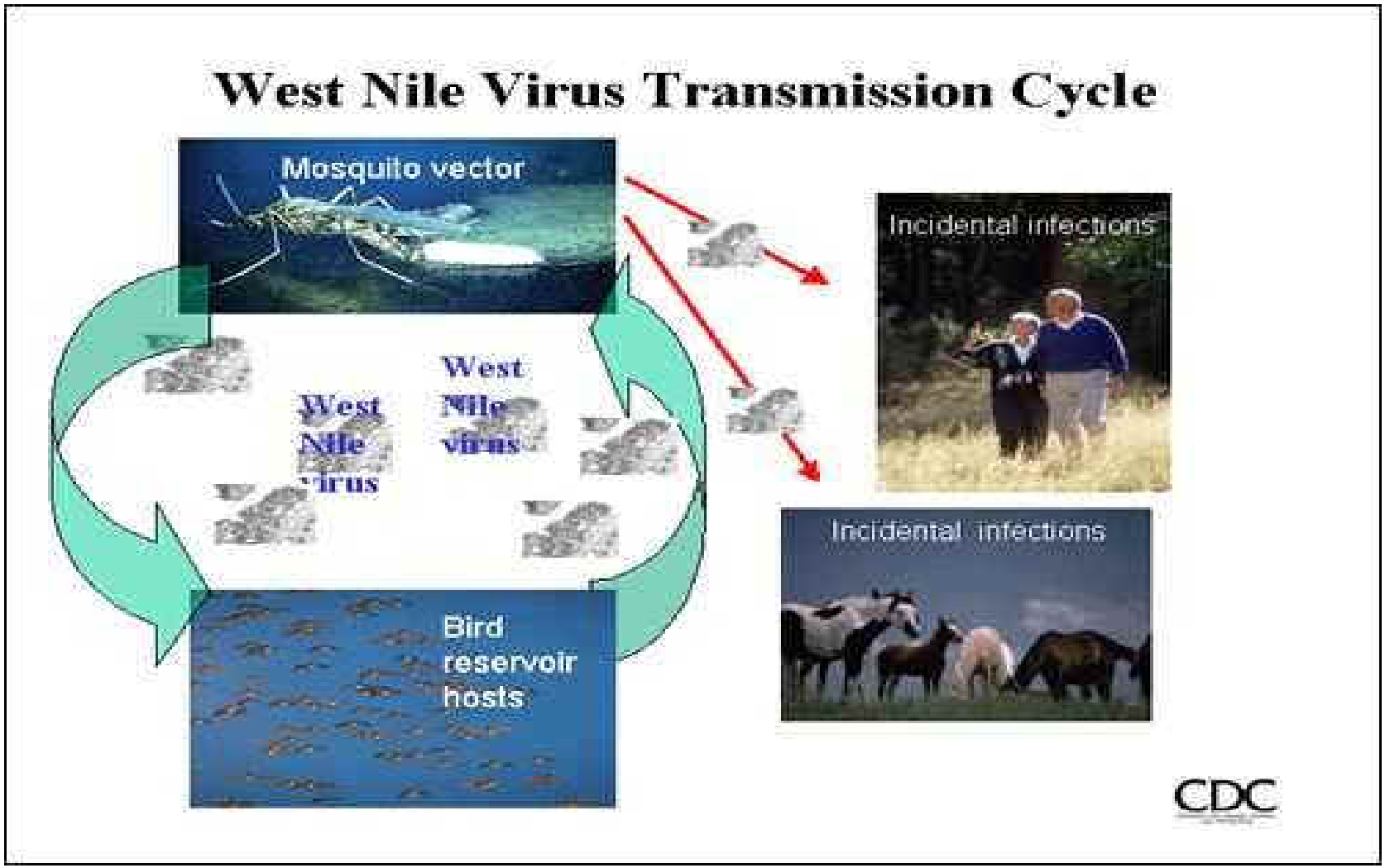
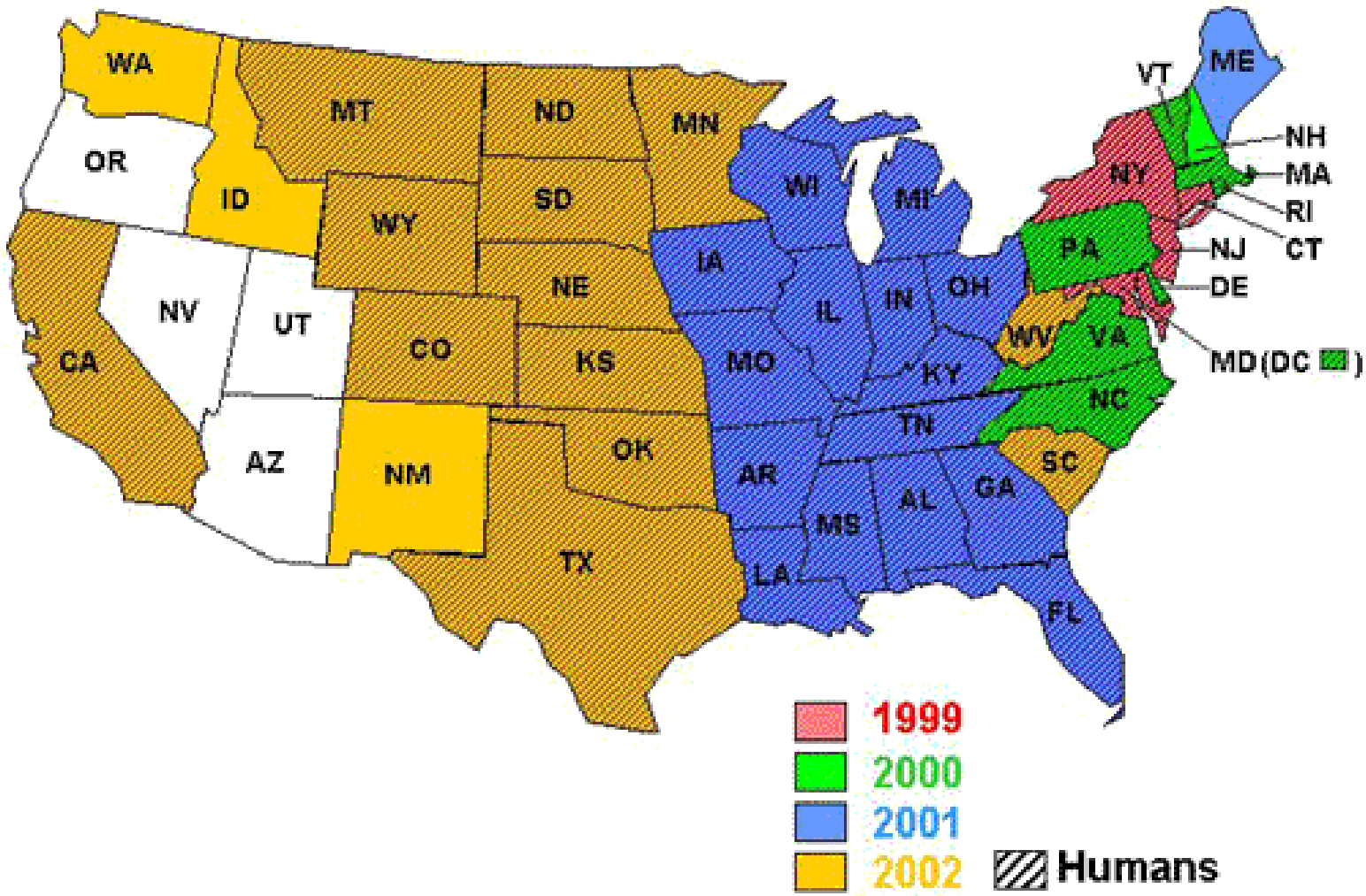
WNV Transmission Cycle

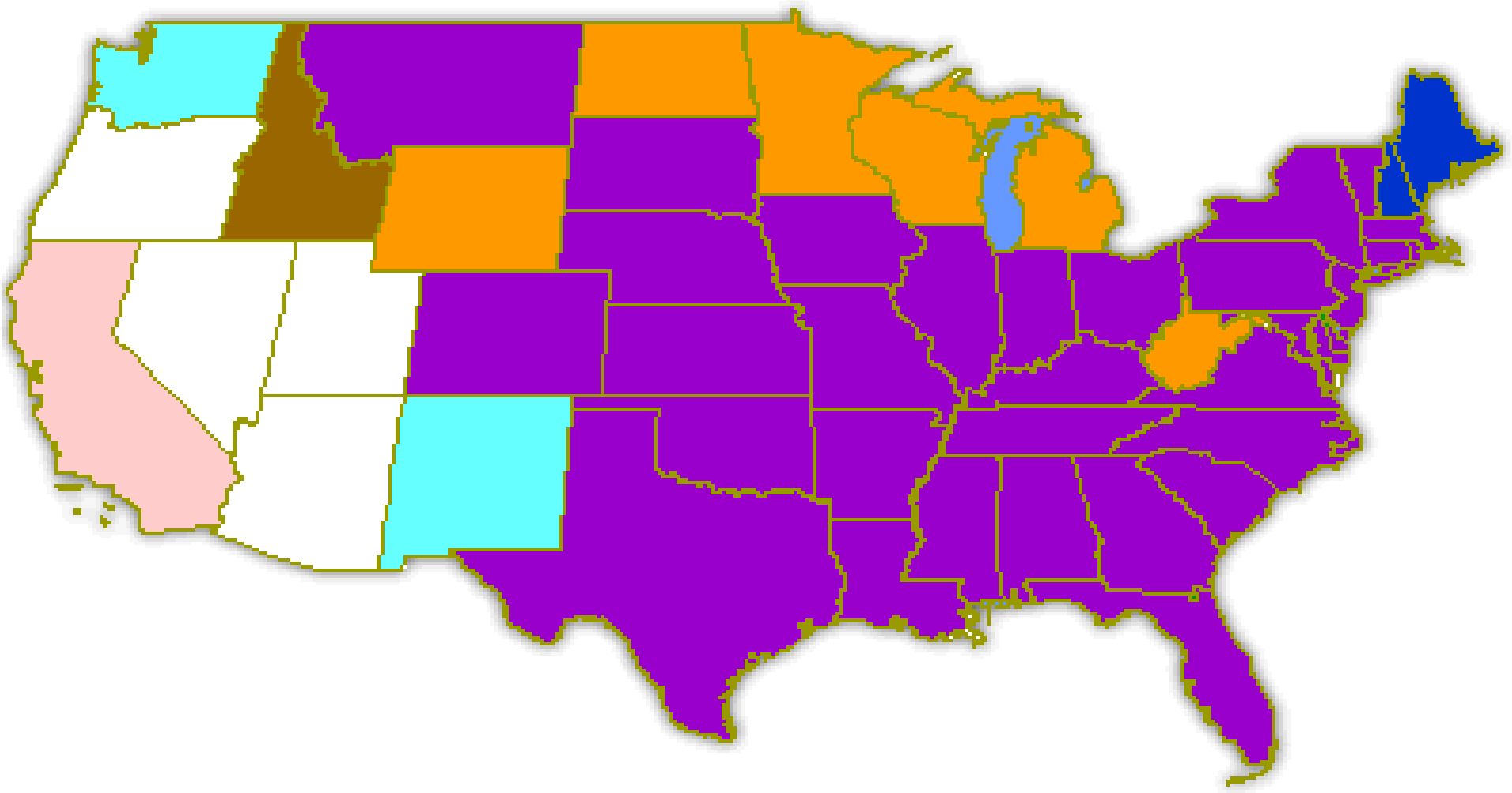


WNV and Animals

- Mosquitoes
- Birds
  - wild
  - domestic
- Horses
- Humans
- Other animals?

West Nile Virus in the United States, 1999 - 2002



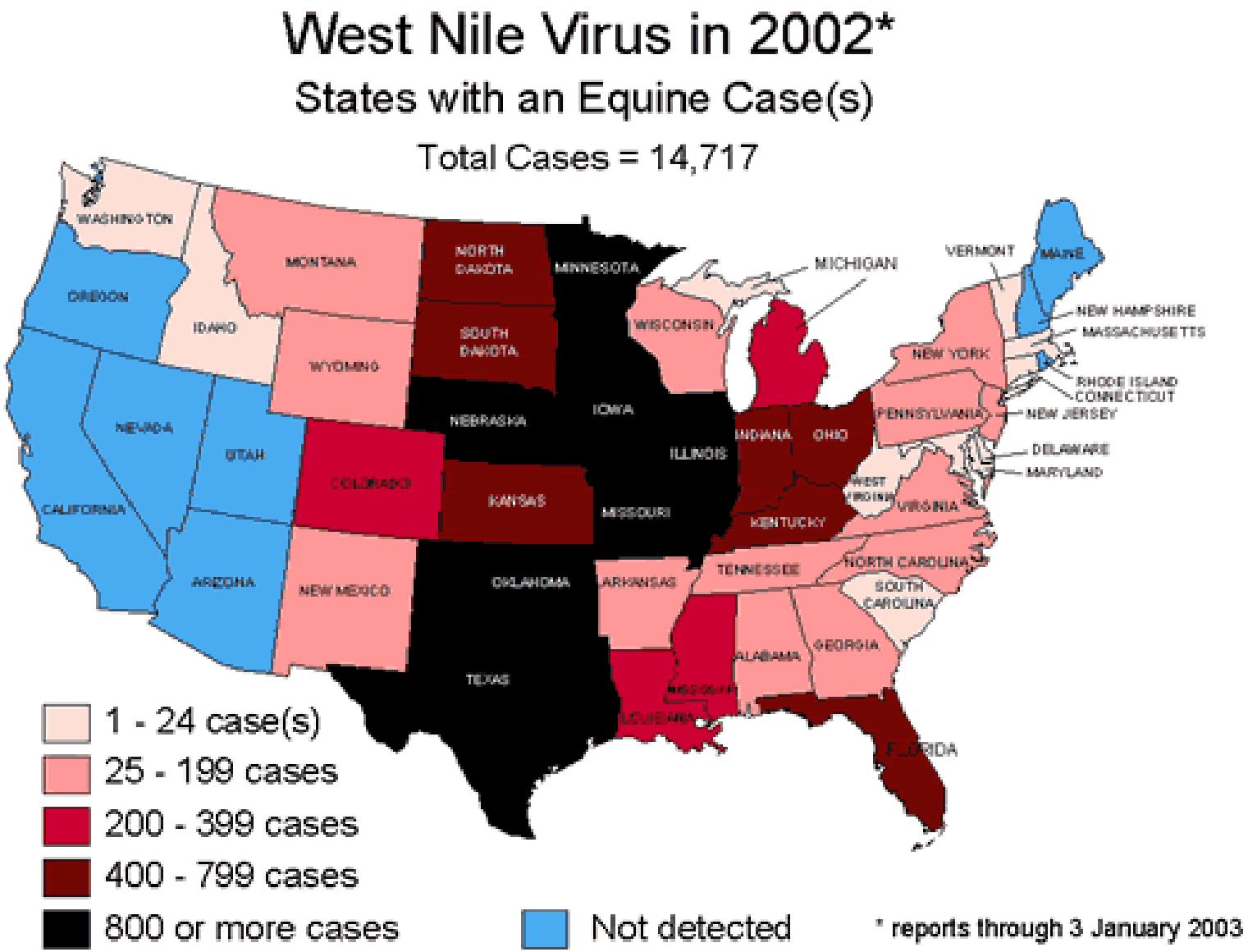


States with West Nile Virus in 2002

- Humans only
- Birds and horses
- Birds and mosquitoes
- Birds, horses and humans
- Horses only
- Birds, humans, and mosquitoes
- Humans, birds, horses, mosquitoes

From: www.thehorse.com

National Equine WNV Cases



Equine WNV Clinical Disease

- Listlessness
- (Headache, flu-like)
- Fever
- Skin twitching
- Muscle fasciculations
- Stumbling
- Incoordination
- Weakness of limbs
- Ataxia
- Partial paralysis
- Possible death

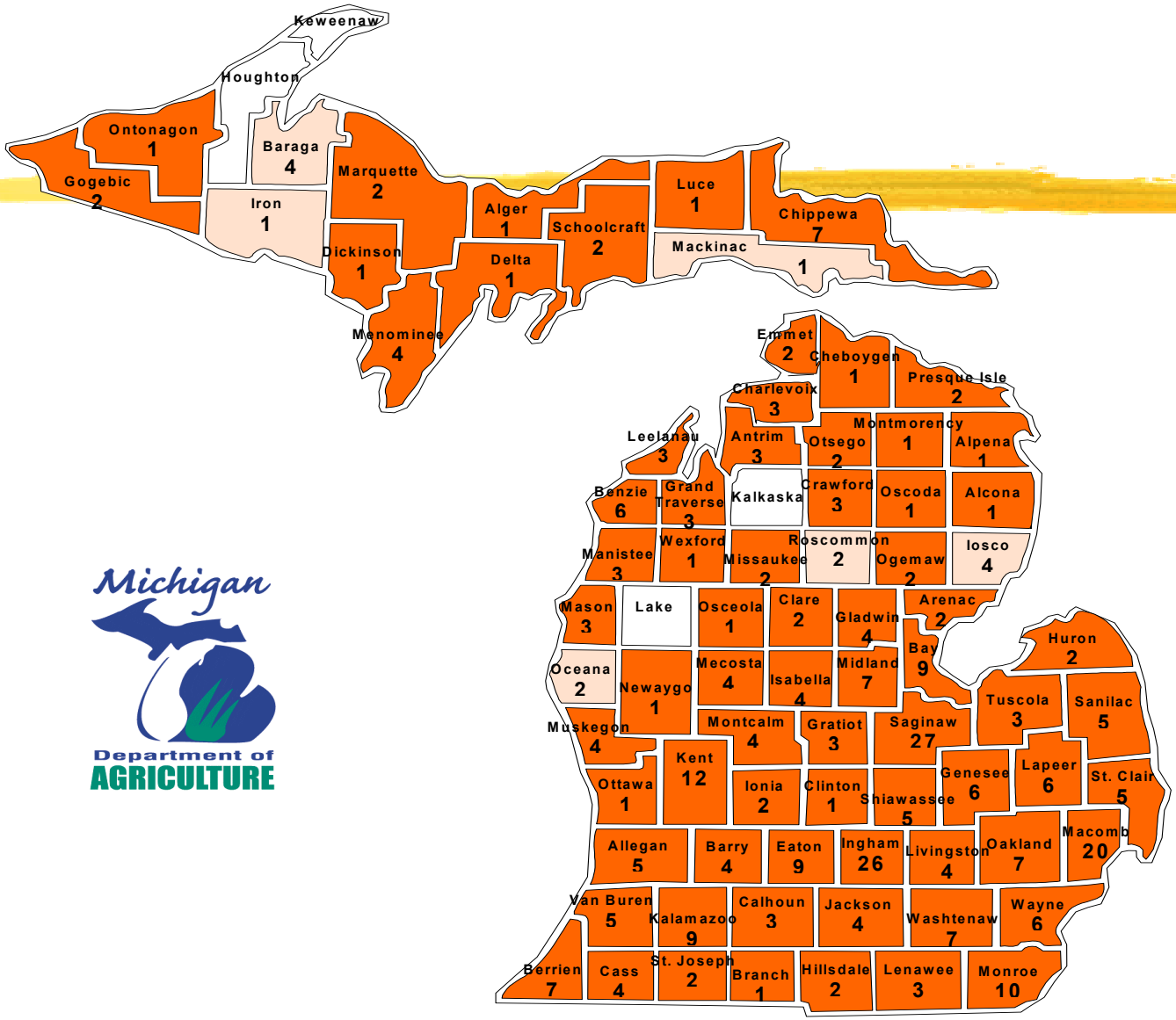
Equine WNV Facial Paralysis

Equine WNV Treatment & Prognosis

- Majority of cases: mild or non-apparent
- Small % get sick
- > 65% affected horses recover to normal function when treated.
- If recumbent, guarded prognosis
- No specific treatment – support (IV fluids/NG tube feeding; control fever; safe, quiet housing.)

Positive Avian WNV Counties 2002

Last Updated 11/1/02



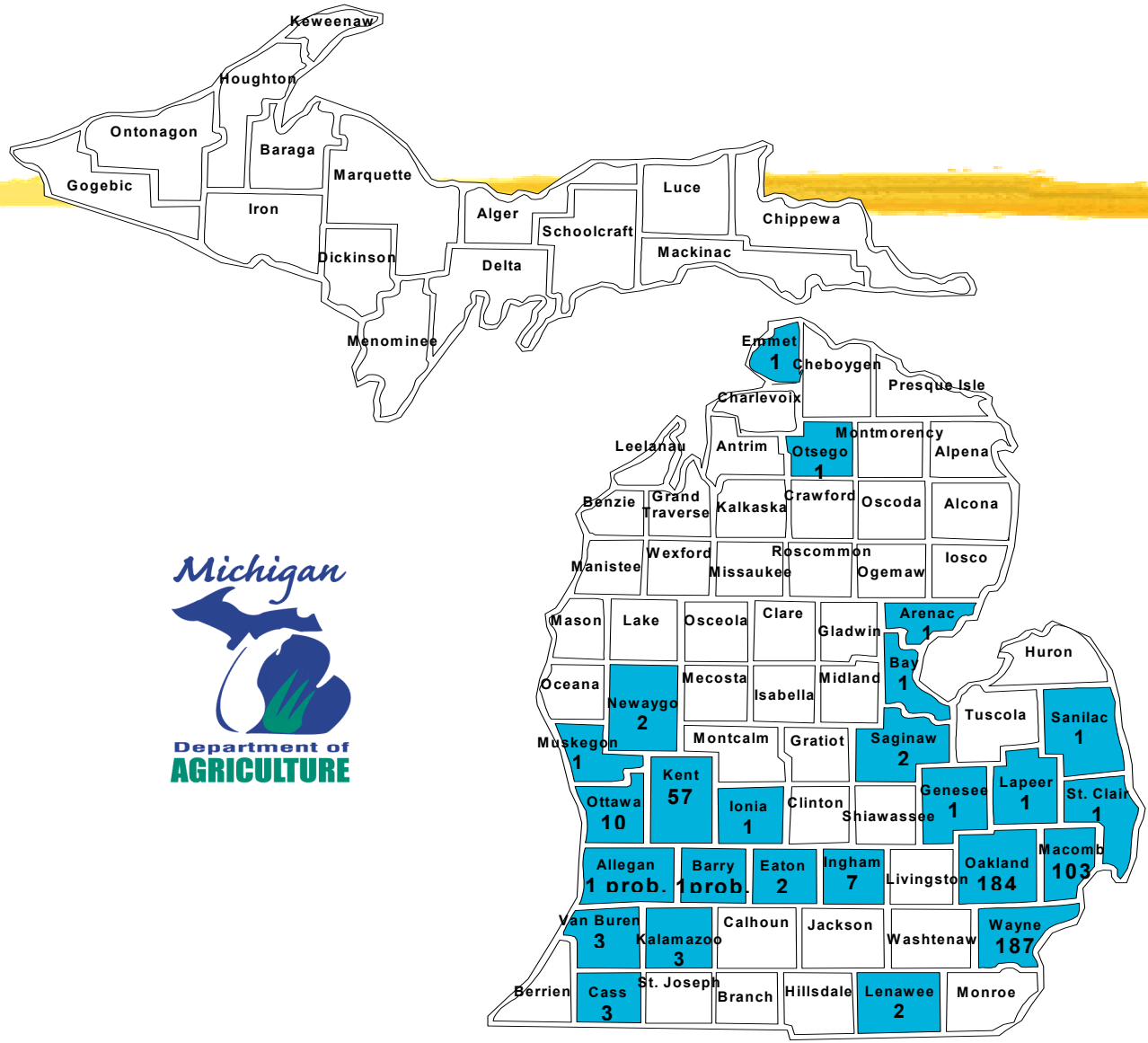
Michigan Department of AGRICULTURE

= Counties with testing activity negative for West Nile Virus (number of birds tested)
= Counties with a positive WNV bird (number of birds tested before the positive)

Note: Testing of birds stops after the first positive per county is confirmed. Testing of birds ends November 1, 2002

Positive Human WNV Counties 2002

Last Updated 2/18/03



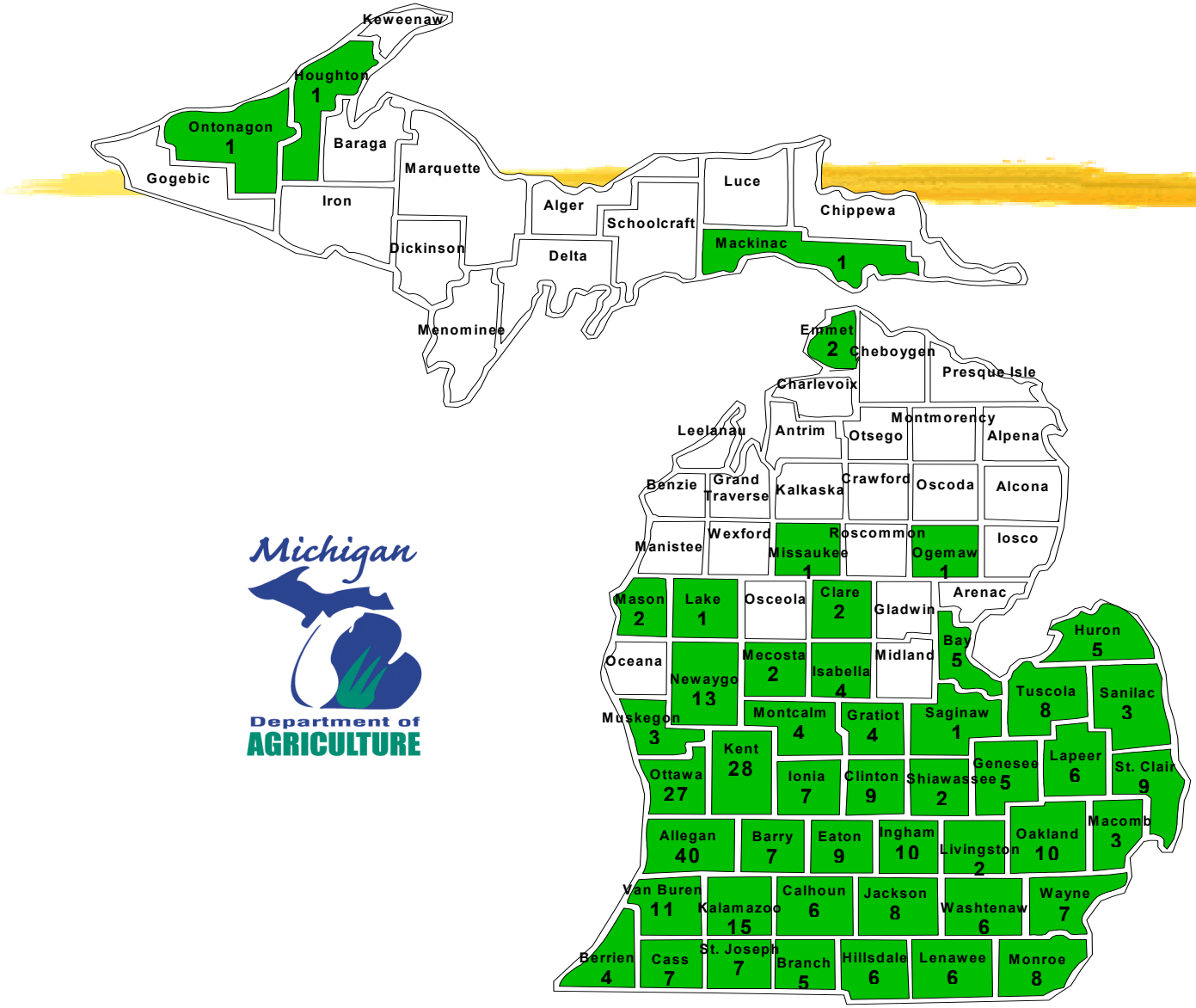
= 24 Counties with a confirmed positive WNV human cases (total number of confirmed *and* probable positive cases). ***577 total cases, 51 fatalities (Kent Co. = 4, Lenawee Co. = 1, Macomb Co. = 6, Newaygo Co. = 1, Oakland Co. = 20, Ottawa Co. = 3, St. Clair Co. = 1, and Wayne Co. = 15)***.

WNV in humans…

- Michigan cases:
  - 51 confirmed fatalities
    - 58.8% male
    - 84.3% over age 65
  - 577 confirmed cases
    - 55.1% male
  - Second in fatalities to Illinois at 54.
- National cases:
  - 254 fatalities
  - 3893 total confirmed cases

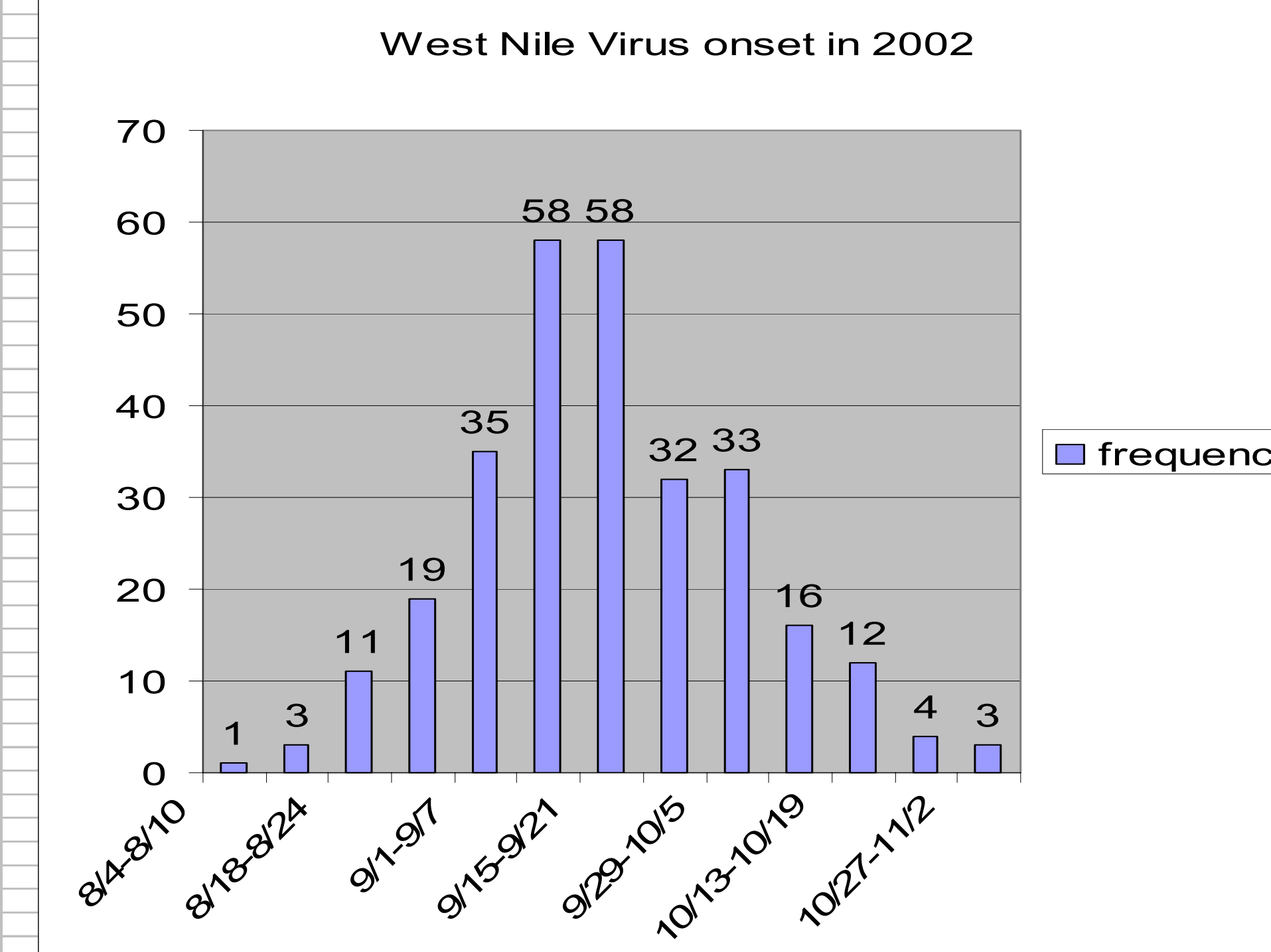
Positive Equine WNV Counties 2002

Last Updated 5 Feb 2003



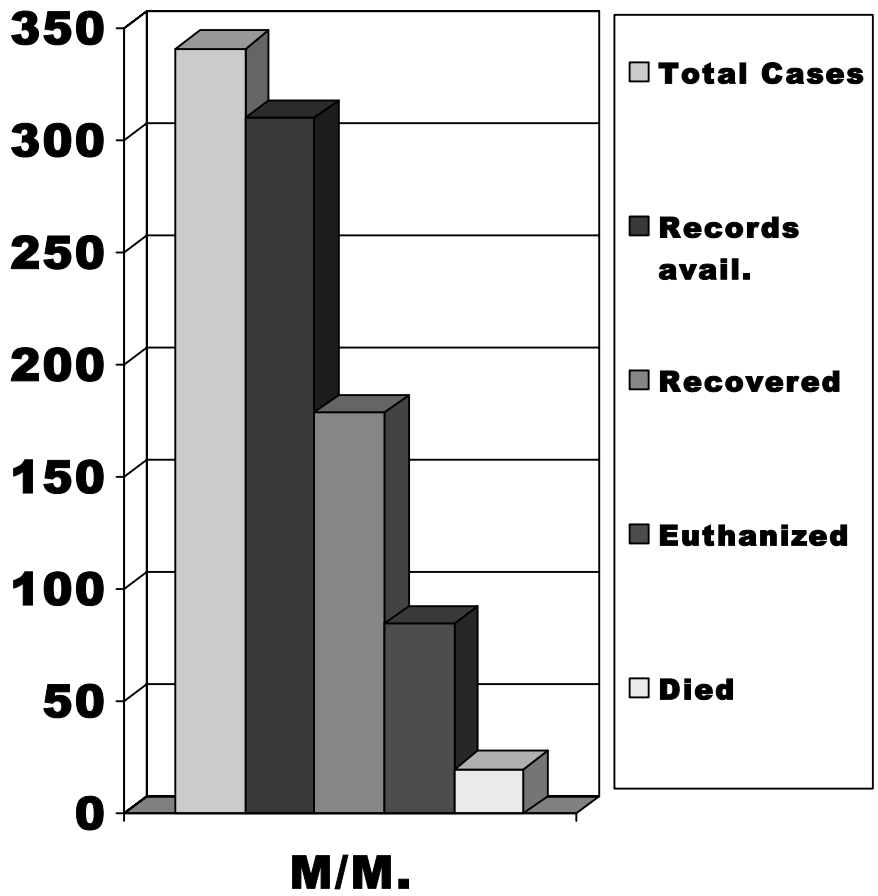
■ = Counties with a positive WNV horse or other equine species (number of positive cases)

Please Note: Locations have not been verified for all of the equine cases and therefore 7 cases are not shown on the map. The total number of positive cases is 341.


West Nile Virus onset in 2002
70
60
50
40
30
20
10
0
1
3
11
19
35
58
58
32
33
16
12
4
3
8/4-8/10
8/18-8/24
9/1-9/7
9/15-9/21
9/29-10/5
10/13-10/19
10/27-11/2
frequenc

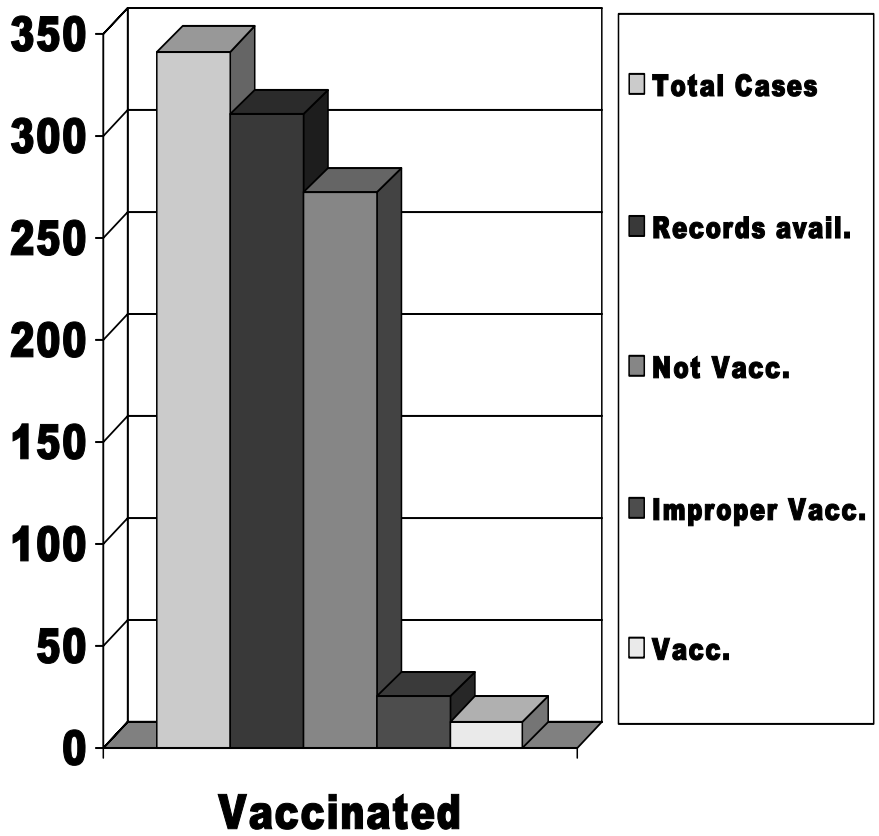
Michigan 2002 Equine WNV cases:

- **Morbidity/Mortality Stats…**
  - Mortality reports available on 310 of 341 total cases.
  - 179 recovered (63%)
  - 85 euthanized (30%)
  - 20 deaths (7%)



Michigan 2002 Equine WNV cases:

- **Vaccination Stats…**
  - Vaccination history available on 310 of 341 total cases.
  - 272 not vacc. (88%)
  - 25 improperly vacc. (8%)
  - 13 vaccinated (4%)



Michigan 2002 Equine WNV cases:

No statistical difference in sickness and/or death based on age, breed or gender.

- Unknown denominators:
  - Vaccine saturation of State/National herd
  - Sub-clinical infection level
  - Naturally acquired immunity

WNV: This year (2003)…

- **Surveillance**
  - Crows, Blue Jays by zipcode
  - Dead bird sightings
  - Mosquitoes
  - Horses
    - Live: tested by pvt. veterinarians
    - Dead: tested by MDA
  - Dogs
  - Other animals

WNV: This year (2003)…

- **Exposure risk control**
  - Source reduction
    - Surface water management
    - Habitat control
  - Pesticides
    - Larvacides
    - Adulticides
  - Avoidance
    - Repellants
    - Behavior modification
- **U.S. House Bill 416-9**
  - **Up to $10,000 per local gov't.**
  - **Up to $100,000 per county with 50% match.**
  - **$10,000 to a State agency for coordination.**
  - **Sponsored by Rep. Billy Tauzin, R-La. and others.**

WNV: This year and Next (years)…

- Immunity?
  - Naturally acquired
    - birds
    - humans
    - Horses
  - Artificially acquired
    - Equine vaccine
      - fully licensed as of 6 Feb. 2003
      - Dosing recommendations…
- Similar to EEE, SLE?
- Other animals?
  - Dogs…

Protecting Your Horse from WNV

A vaccine is available as an aid in control of WNV in horses. The vaccine has been shown safe for use in horses. Effectiveness has not yet been proven; the vaccine has been approved for release under a provisional license until effectiveness is shown, due to the rapidly emerging nature of this disease. The WNV vaccine is a killed, adjuvanted product similar to vaccines against EEE and WEE and is only available through licensed veterinarians. Horses vaccinated against EEE, WEE, and Venezuelan Equine Encephalitis are not protected against infection with WNV. Horse owners are advised to consult their veterinarian concerning WNV vaccination of their horses. Vaccinated horses will test positive on WNV tests.

In addition to the vaccine for horses, simple insect control measures should be utilized. Consider the use of insect repellents, and place horses in barns/stables under fans during dusk, dawn, and other times when mosquitoes are present. Eliminate opportunities for mosquito breeding by draining wet areas of pasture; filling puddles; repairing eaves troughs, gutters, etc.; clearing any containers that might hold even small pools of water; and draining water tanks once or twice weekly.

Reporting WNV and Other Reportable Animal Diseases

WNV is a reportable animal disease. If you suspect that an animal may have WNV, you must immediately contact your veterinarian, state veterinarian, or federal veterinarian.

Contact Information

To report a suspected case of WNV, EEE, WEE, or rabies:

Michigan Department of Agriculture
Animal Industry Division
P.O. Box 30017, Lansing, MI 48909
www.michigan.gov/mda

Monday-Friday, 8:00 A.M. – 5:00 P.M.
(517) 373-1077

or:
Weekends or after hours
(517) 373-0440

United States Department of Agriculture Animal and Plant Health Inspection Service, Veterinary Services

Monday-Friday, 8:00 A.M. – 5:00 P.M.
(517) 324-5290

Veterinarians may submit blood samples for WNV testing to:

National Veterinary Services Laboratory
1800 Dayton Road
Ames, Iowa 50017
(515) 663-7357

Animal Health Diagnostic Laboratory
B629 West Fee Hall
Michigan State University
East Lansing, MI 48824-1316
(517) 353-5275

For more information, visit the Michigan Department of Agriculture Web site at *www.michigan.gov/mda*

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West Nile Virus in Horses

Diagnosis and Prevention Tips

Prepared by the
Michigan Department of Agriculture & Michigan State University,
College of Veterinary Medicine and Department of Animal Science

What is West Nile Virus?

West Nile Virus (WNV) is a mosquito-borne virus that causes encephalitis (inflammation of the brain) and/or meningitis (inflammation of the lining of the brain and spinal cord). Outbreaks of WNV have occurred in Egypt, Asia, Israel, Africa, and some parts of Europe and Australia. The virus was first found in the U.S. in the fall of 1999 in New York City and has since spread to southern and midwestern states, including Michigan.

Birds: the Primary Reservoir Species for WNV

WNV infects and multiplies in birds, which then serve as the reservoir species for the virus. At least 76 types of birds are capable of carrying the virus. The impact of the disease in birds varies, with American Crows frequently dying from the infection. Many other bird species survive infection with mild or no indication of disease.

WNV is spread from bird to bird by mosquitoes when they bite, or take a blood meal, from birds,that are infected with the virus. Mosquitoes are also capable of spreading the virus to horses, humans, and other mammals. Migrating birds may have a significant impact on the spread of the virus across the U.S.

Birds that are infected with WNV may show signs such as the inability to fly, incoordination, abnormal movements, and death.

WNV in Horses

Most horses bitten by carrier mosquitoes do not develop disease. Of those that do, approximately one-third develop severe disease and die or are so affected that euthanasia is required. The incubation period, or the time between the bite of an infected mosquito and when clinical signs appear, ranges from seven to 14 days.

Although horses do not usually develop clinical symptoms of WNV, horses that do become ill may show symptoms ranging from very mild signs to deadly illness. Typical signs include ataxia (incoordination, stumbling, limb weakness) that either appears suddenly or appears gradually and worsens; sleepiness; dullness; listlessness; facial paralysis (droopy eyelids, lower lip); and an inability to rise. Some horses may develop mild fevers, blindness, muscle trembling, seizures, and other signs.

Horses can not spread the disease to humans, but humans are susceptible to the disease if bitten by a carrier mosquito.

WNV in Other Mammals

WNV may be capable of infecting mammals other than horses or humans. Antibody has been found in blood samples from bats, cats, chipmunks, gray squirrels, domestic rabbits, eastern striped skunks, cows, sheep, and pigs. Although some of these animals may become ill, unlike horses and humans, they do not show signs of or develop encephalitis.

There is no evidence that infected horses, humans, or other animals are able to transmit the virus to other animals, people, or mosquitoes. Only a wild bird/mosquito transmission cycle has been proven as a means of transmitting WNV.

Diagnosis of WNV in Horses

Diagnosis of WNV infection in horses involves testing the blood serum for antibodies against the virus.

Since horses vaccinated for WNV and foals of positive-testing mares are likely to have a positive blood test for the virus, veterinarians consider blood test results, clinical symptoms and the possibility of other neurological diseases, including rabies, Eastern Equine Encephalitis (EEE), Western Equine Encephalitis (WEE), and Equine Protozoal Myeloencephalitis (EPM), before making a diagnosis.

Blood samples should be collected by a veterinarian and sent to the National Veterinary Services Laboratory or to the Animal Health Diagnostic Laboratory (AHDL) at Michigan State University. The heads of horses that die or are euthanized due to neurological disease should be submitted for testing to the AHDL. The Michigan Department of Agriculture may provide transportation of the specimen to the AHDL, and may also cover the laboratory expenses. Addresses and contact information are listed on the back of this brochure.

Treatment and Long-term Effects of WNV

Currently, there is no specific treatment for the disease caused by WNV. Supportive therapy should be administered by the horse owner's veterinarian to reduce clinical signs and the possibility for secondary infections. When a horse becomes infected, with or without clinical disease, that horse develops antibodies in response to the infection. Infected horses can acquire long lasting immunity to WNV after recovery due to these antibodies. If the horse develops encephalitis, there may not be full recovery and the horse may possibly have permanent central nervous system damage.

West Nile Virus in Horses

Michigan Department of AGRICULTURE

Q. What is it?

A. West Nile Virus (WNV) is a mosquito-borne virus that causes encephalitis (inflammation of the brain) and/or meningitis (inflammation of the lining of the brain and spinal cord). Outbreaks of the disease caused by WNV have occurred in Egypt, Asia, Israel, South Africa, and some parts of Europe and Australia. The virus was first detected in the United States in the fall of 1999 in New York City, and has since spread to southern and midwestern states.

Q. What types of animals does it affect?

A. WNV primarily infects and multiplies in birds, which serve as reservoirs for the virus. There are at least 76 types of birds capable of carrying the virus. The severity of the disease in birds varies among species, with American Crows frequently dying from the infection. WNV can also infect and cause illness in horses and humans, although only a small percentage of infected animals or people become sick. The virus also has been shown to infect several other types of mammals (including bats, cats, chipmunks, squirrels, skunks, and domestic rabbits) often without causing clinical signs.

Q. How do animals get the virus?

A. Animals must be bitten by a virus-carrying mosquito in order to become infected with WNV. The so-called "enzootic" cycle involves transmission from bird to bird. Mosquitoes become infected when they bite, or take a blood meal, from a bird carrying WNV; the infected mosquito then transmits the virus to another bird through a second bite. Migrating birds carrying WNV in their blood have had a significant impact on the spread of the virus across North America. Some species of mosquitoes bite mammals as well as birds, and this is how the virus may be transmitted to a horse, human, or other mammal. There is no evidence that infected horses, humans, or other animals are able to transmit the virus to other animals, humans, or mosquitoes.

Q. What is the incubation period of West Nile virus in horses?

A. The incubation period, or the time between the bite by an infected mosquito and the onset of clinical signs, ranges from 7 – 14 days.

Q. What are the clinical signs of WNV infection?

A. Birds that are infected with WNV may show signs such as the inability to fly, incoordination, and abnormal movements. Most crows are simply found dead. Clinical signs of horses which do become ill range from very mild to fatal illness. Typical signs include ataxia (incoordination, stumbling, limb weakness) that either appears suddenly or appears gradually and worsens, somnolence (sleepiness), dullness, listlessness, facial paralysis (droopy eyelids, lower lip), and inability to rise. Some horses may develop mild fevers, blindness, muscle trembling, seizures, and many other signs. Rabies, Eastern Equine Encephalitis (EEE), Western Equine Encephalitis (WEE), Equine Protozoal Myeloencephalitis (EPM), and other neurologic diseases should be considered in a differential diagnosis for suspect horses.

Q. How is WNV infection diagnosed in a horse showing symptoms?

A. Diagnosis of WNV infection in horses involves testing the blood serum or cerebrospinal fluid (CSF) for antibodies against the virus. Testing is done at the National Veterinary Services Laboratory (NVSL) in Ames, Iowa, and blood and/or CSF samples should be sent by

veterinarians directly to NVSL, or to the Animal Health Diagnostic Laboratory at Michigan State University (MSU AHDL). Horses that die with acute neurologic signs or are euthanized should be tested for rabies, WNV infection, and other diseases. The animal's head should be submitted to the MSU AHDL. Michigan Department of Agriculture will transport the head to the lab and will also cover the laboratory expenses.

Q. Is there treatment for the disease?

A. Currently there is no specific treatment for the disease caused by West Nile Virus. Supportive therapy should be administered by the horse owner's veterinarian to reduce clinical signs and the possibility for secondary infections. Approximately 65% of affected horses will recover from the disease.

Q. If my horse becomes ill and recovers, what are the long-term effects of the disease?

A. When a horse becomes infected with WNV, with or without clinical disease, the horse develops an immune response to the infection. Immunity is believed to be long lasting, such that the horse may be protected for several years from another WNV infection. Most horses with neurologic disease recover to be completely normal, although some may have residual nervous system damage.

Q. What options are available to protect horses from WNV infection?

A. A vaccine is available as an aid in control of this disease in horses. The product, developed by Fort Dodge Animal Health, has been shown to be safe for use, but effectiveness has not been proven. Due to the rapidly emerging nature of this disease and its spread across North America, the vaccine has been approved for release under a provisional license until effectiveness can be shown. The vaccine is a killed, adjuvanted product similar to vaccines against Eastern Equine Encephalitis and Western Equine Encephalitis and is only available through licensed veterinarians. Horses vaccinated against Eastern, Western, and Venezuelan equine encephalitis are not protected against infection with West Nile Virus. Horse owners are advised to consult with their veterinarian concerning West Nile Virus vaccination of their horses.

In addition to the equine vaccine, standard insect control measures should be utilized. Consider the use of insect repellents, and place horses in barns/stables under fans during dusk, dawn, and other times when mosquitoes are present. Eliminate opportunities for mosquito breeding by draining wet areas of pasture, draining puddles, repairing eave troughs and gutters, clearing any containers that might hold even small pools of water, and draining water tanks once or twice weekly.

This bulletin was produced through the combined efforts of MSU, AHDL, and MDA. Please consult your veterinarian for specific information regarding diagnosis, treatment and prevention for your own horses. Additional information regarding recent cases and spread of WNV is available at www.mda.state.mi.us. Individuals wishing to report dead crows or blue jays should call the WNV Hotline (1-888-668-0869).

For further information:

- www.michigan.gov/mda
- www.michigan.gov/mdch
- After 1 April 2003…
  - www.michigan.gov/westnilevirus
- Others…